denominations which flourish in the United States. But February in England is an awkward month to gather together from all over the world a large assemblage of distinguished men of science, and Cambridge decided to celebrate the centenary of her great biologist in what we hope may prove the more genial month of June.

The question of date was from the first a matter of some difficulty; it was, so far as possible, desirable to select such a time as would enable professors and others who are tied by university duties to be present, so it could not be fixed before the end of June. On the other hand, owing to the fact that the various courses of university lectures, which at Cambridge yearly become more numerous during the long vacation, begin this summer on July 6, the colleges will have their rooms for the most part fully occupied by July 5.

There was thus little margin for choice, and Tuesday, June 22, the day of the second general admission to degrees, was settled for the first day of the celebration. This will formally begin at 8.30 p.m., when there will be a reception of delegates and other invited guests in the Fitzwilliam Museum by the Chancellor of the University, Lord Rayleigh, O.M., F.R.S., Sc.D. The Chancellor will receive guests at the head of the staircase, and to him all delegates and guests who are not resident members of the Senate will be formally presented by the Registrary. On Wednesday, June 23, at 10.30 a.m., presentations of addresses by delegates of universities, colleges, academies, and learned societies will take place in the Senate House. This ceremony will begin with a short address by the Chancellor, followed by the presentation of delegates and of addresses. A short speech will be delivered by one representative of each of the chief countries represented.

During the earlier half of the afternoon visits to colleges will be paid, and from 4 to 6 p.m. a garden party will be given by the master and fellows of Christ's College in the college grounds. The rooms occupied by Charles Darwin when an undergraduate of Christ's College will be open to visitors during the afternoon of Wednesday, June 23, and during the morning and afternoon of Thursday, June 24. The bronze bust by Mr. Couper, of New York, which the American delegates are presenting to Christ's College will be on view.

At 7 p.m. there will be a banquet in the new examination hall, behind the museums.

After the banquet the master and fellows of Pembroke College will give an "At Home" in the college hall and gardens.

On Thursday, June 24, at 11 a.m., honorary degrees will be conferred in the Senate House on some eighteen distinguished men who have followed in the footsteps of Darwin; amongst these our only fellow-countryman is Mr. Francis Darwin, his father's distinguished biographer. At 12 noon the Rede lecture will be delivered by Sir Archibald Geikie, K.C.B., President of the Royal Society. His subject will be "Darwin as Geologist."

During the afternoon a garden party will be given by Mr. William Erasmus Darwin, Sir George and Lady Darwin, Mr. Francis Darwin and Miss Frances Darwin, Major and Mrs. Leonard Darwin, Mr. and Mrs. Horace Darwin, Mrs. Litchfield, and Miss Darwin, in the Fellows' Garden, or, if wet, in the hall and cloisters of Trinity College, which have been kindly lent by the master and fellows.

During the celebration, and for some days before, there will be an exhibition of portraits, books, and other objects of interest in connection with Darwin, in the Old Library of Christ's College (entrance from the First Court). The exhibition will be open from 10 a.m. to 1 p.m., and from 2 p.m. to 5 p.m.

Amongst the more interesting exhibits are the oil painting by Collier, lent by the Linnean Society; one by Richmond, lent by the University; and one by Ouless, lent by Mr. William Darwin. There are also numerous oil paintings of Erasmus Darwin, Robert W. Darwin, and other members of the family; several water-colours of Down and of Charles Darwin's birthplace are also shown. A very large number of sketches and photographs are also exhibited, many MS. note-books and letters, and numerous copies of the first editions of Darwin's books containing his own notes. There is also a collection of instruments used on board the *Beagle*, and medals, orders, and diplomas presented to Charles Darwin.

Charles Darwin's library, which Mr. Francis Darwin has generously transferred to the Botany School, Downing Street, may be seen on application at the Botany School at any time between 10 a.m. and 1 p.m., or between 2.30 p.m. and 5.30 p.m., during the celebration. A few of the most interesting volumes will be displayed in the Botanical Museum. Further, the Librarian, Mr. F. J. H. Jenkinson, has arranged in the University Library an exhibition of MSS. and books illustrating the progress of biological study during the last fifty years.

In connection with the celebration, numerous publications are appearing at Cambridge. At the instigation of the Philosophical Society the University Press has issued a volume of important essays, edited by Prof. Seward, in which some of the leading biologists of the world pass in review the results achieved by Darwin's own work, and others concern themselves with the progress of science on lines which are the direct outcome of his work. The University Press is also publishing reprints of the first sketch of "The Origin of Species." A copy of this will be presented to each of the delegates. Later it will be re-printed, together with Darwin's second sketch of his "species-theory," in a single volume, and be on sale. The executive committee is, further, preparing a quarto volume entitled "The Order of the Proceedings at the Darwin Centenary." This will have numerous illustrations, and will contain a sketch of Charles Darwin's life, together with a programme of the celebration.

Finally, Christ's College is publishing an exhaustive catalogue of the Darwin Exhibition, and a special Darwin number of the college magazine, on the lines of the very successful Milton number of last year. This will contain an account of the life of Darwin at Shrewsbury; at his two universities (Edinburgh and Cambridge); a sketch of Christ's College about the time Darwin was in residence, by the Master of the College; Darwin and the Linnean Society, by Dr. Daydon Jackson, the general secretary of the society; and some letters which Mr. A. R. Wallace has kindly placed at the disposal of the magazine committee, some of which have not been published before. There will also be short articles on present-day Darwinism, and on his Plants and Animals under domestication.

NOTES.

THE closing meeting of the seventh International Congress of Applied Chemistry was held on June 2, when Mr. Whitelaw Reid, the American Ambassador, read a letter from the Secretary of State of the United States intimating that the President had approved a joint resolution of the Senate and the House of Representatives authorising the President to invite the International Congress of Applied Chemistry to hold its eighth meeting in the United States of America in 1912. The invitation was supported by Dr. Wiley, of the U.S. Department of Agriculture, and Prof. R. Meldola, F.R.S., representing the Society of Chemical Industry, and was accepted with acclamation. Prof. E. W. Morley was elected the honorary president of the eighth congress, and Dr. W. H. Nichols the acting president. The official American delegates to the seventh congress were constituted the organising committee of the eighth congress, with power to add to their number.

At a meeting of subscribers to the statue of Lord Kelvin for Belfast, held on June 2, it was resolved unanimously that the statue be erected in the grounds of the City Hall instead of in the grounds of the new Queen's University as recommended by the executive committee.

Prof. A. Laurence Rotch, director of Blue Hill Meteorological Observatory, U.S.A., has been elected an honorary member of the Austrian Meteorological Society.

Prof. T. A. Jaggar, of the Massachusetts Institute of Technology, has completed his geophysical investigations in Japan. He will spend the summer in observing volcanic phenomena in Hawaii, with special reference to the reported activity of Kilauea.

The U.S. Navy Department is about to construct, in Rock Creek Park, Washington, a concrete tower, 600 feet high, for the purposes of wireless telegraphy. This will be higher than the Washington Monument. Indeed, no other American building will have a greater height, with the exception of two high structures in New York. The plant that will be installed is to send messages to a distance of 3000 miles.

A note in a recent issue of *Science* says that it has been estimated that the amount of wood annually consumed in the United States at the present time is twenty-three billion cubic feet, while the growth of the forest is only seven billion feet. In other words, Americans all over the country are using more than three times as much wood as the forests are producing. The figures are based upon a large number of State and local reports collected by the Government and upon actual measurements.

The American Geographical Society has accepted Mrs. Collis P. Huntington's gift of a 50,000*l.* site for a new building in New York City, overlooking the Hudson River. We also learn from *Science* that Mr. A. M. Huntington, the president of the society, has given 10,000*l.* toward the building fund, which will be increased by further subscriptions and the proceeds of the sale of the old building, which should be about 50,000*l.*

A new society—the Illuminating Engineering Society—has been formed to make the subject of illumination as a whole its special province, to collect together the scattered data bearing on the subject, and to provide a platform for the impartial discussion of all methods of lighting. Anyone interested in the subject of illumination and the aims of the society may become a member, and may be of either sex and any nationality. The first session will commence in November next. All particulars may be obtained from the hon. secretary, Mr. L. Gaster, editor of the *Illuminating Engineer*, 32 Victoria Street, London, S.W.

According to the report for 1908, the Horniman Museum at Forest Hill continues to make rapid and marked progress as a public educator, the Saturday afternoon lectures being so well attended that a large number of persons have to be refused admission. As the average number of disappointed individuals at each lecture is stated to be about fifty, the urgent need of a lecture-hall is self-apparent. At present the lectures are delivered in the insect-room, much to the disadvantage of its proper function. The natural-history collections are in course of re-arrangement, and it is intended to illustrate the adaptation of different groups of vertebrates to various kinds of progression and work, such as swimming, flying, and burrowing, by specially arranged series.

Vol. xix. of the *Journal of Comparative Neurology and Psychology* opens with an article by Mr. J. B. Watson on experiments in connection with colour-vision in monkeys. After reviewing the work of Kinnaman on the same subject, the author arrives at the conclusion that tests by means of coloured papers are practically valueless, and considers that trustworthy results can be attained only by the aid of a continuous spectrum. Next follows the description of the apparatus employed in the experiments. The most surprising result was the failure of the three monkeys experimented upon to react to red; on the other hand, the blue-yellow discrimination arose more rapidly than the red-green, and in one case the habit of reacting to blue (which may prove to be a "preferred" colour) was formed with remarkable rapidity. The writer refrains, however, from drawing any definite conclusions, and winds up as follows:—"With such questions raised is it any wonder that we find it impossible to accept the uncritical results which have been obtained by the use of filters, coloured papers, &c., as evidence for the presence of colour vision in animals?"

The Anaspidacea have lately loomed large in zoological literature, and zoologists will welcome the valuable monograph on this group of primitive Crustacea which Mr. Geoffrey Smith contributes to the May number of the *Quarterly Journal of Microscopical Science*. Carcinologists are, unfortunately, rather apt, while dealing in great detail with the appendages of the Crustacea, to pay but little heed to internal anatomy. In this memoir, however, we are furnished with a full description of the anatomy of the remarkable Tasmanian mountain shrimp, both external and internal, for which zoologists will be duly grateful. As a result of his recent visit to Tasmania, Mr. Smith has been able to secure ample material, not only of *Anaspides tasmaniae*, first described by Thomson in 1893, but also of a new genus and species, *Paranaspides lacustris*, discovered by himself. He also discusses the only other known modern representative of the group, *Koonunga cursor*, recently discovered near Melbourne by Mr. Sayce, and the fossil species from the Carboniferous and Permian formations of various parts of the world. He concludes that the Anaspidacea are a very primitive group of Malacostraca, combining in themselves characters which, in the course of evolution of the more specialised groups, have become "segregated out." In other words, they are of a generalised type. The memoir illustrates in a striking manner the rapidity with which our knowledge of the Crustacea has grown during recent years, largely as the result of work carried out by local or visiting naturalists at the Antipodes.

The May number of the *Quarterly Journal of Microscopical Science* contains also an interesting paper, by Mr. C. Clifford Dobell, on spore-formation in the disporic bacteria. The author's researches tend to throw doubt on the occurrence of "sexuality" in the bacteria, for he sees in the sporulation of the disporic forms, not a degenerate sexual process, but merely an abortive cell-division. Mr. W. Nicoll contributes a long memoir on the structure and classification of the digenetic Trematoda, and two other papers, by Mr. F. H. Gravely on polychæt larvæ, and by Mr. C. H. Martin on Acinetaria, help to make up an unusually interesting number.

IN the *Annals of Tropical Medicine and Parasitology* for May (vol. ii., No. 5), Dr. Breinl discusses the combined atoxyl-mercury treatment of monkeys infected with *Trypanosoma gambiense*, the parasite of sleeping sickness. In five out of six cases this form of treatment resulted in a complete cure.

Two articles by Messrs. Musgrave and Clegg and Miss Polk in the December, 1908, number of the *Philippine Journal of Science* (iii., No. 6) survey, respectively, streptothricosis (diseases due to Streptothrix organisms) and trichocephaliasis (whip-worm infections). These will be very useful on account of the attached bibliographies, which are very complete.

EXPERIMENTAL lead poisoning is the subject of a paper by Mr. K. Goadby in the *Journal of Hygiene* (vol. ix., No. 1, April). The results indicate that poisoning by lead may take place by absorption by the lungs through inhalation of air laden with lead dust, as well as by absorption by the alimentary tract. The journal contains several important papers.

DR. RICKETTS gives some interesting details of experiments on the transmission of "spotted fever," a disease resembling typhus fever occurring in limited tracts of country in the Rocky Mountains (Johns Hopkins Hospital Bulletin, May, vol. xx., No. 218, p. 151). The parasite, formerly supposed to be a piroplasma, is not known, but infection appears to be conveyed by a tick, and can be transmitted to guinea-pigs.

MR. K. SAITO, in a comprehensive article, discusses the occurrence of micro-organisms in the air (Journal of the College of Science, Tokio, vol. xxiii., 1907–8, art. 15). No fewer than fifty-five species of bacilli and seventeen species of cocci were isolated, of which eighteen are described as new species.

THE Bulletin of the Sleeping Sickness Bureau (No. 6) contains a note on the confirmation of Kleine's work that tsetse-flies (*G. palpalis*) fed on animals infected with *Trypanosoma brucei* fail to infect fresh animals during the following fourteen, or possibly twenty, days, but after that interval again become infective up to at least the forty-seventh day. Colonel Sir David Bruce has repeated Kleine's work with *G. palpalis* and the trypanosome of sleeping sickness of man, *T. gambiense*, and finds that the same latency in infectivity of the flies exists. This is a very important discovery, and it will be necessary to determine how long the flies may retain their power of infecting.

A VERY complete set of figures, prepared by Dr. E. J. Durand to illustrate the development of the sexual organs and sporogonium of *Marchantia polymorpha*, is published in the Bulletin of the Torrey Botanical Club (vol. xxxv.).

IN connection with the possible utilisation of rain or dew, Mr. S. Awano has investigated the power of plants to absorb moisture through the leaf surface. The question was studied from an ecological standpoint, and the results are tabulated, both individually and according to plant formations, in the Journal of the College of Science, Tokio University (vol. xxvii., art. 1). As would be expected, it was found that the upper surfaces of floating leaves, also the surfaces of leaves of strand plants absorb but slightly, if at all, while those of shade plants and ferns absorb fairly readily.

THE Government of India has published, as Forest Pamphlet No. 4, a note by Mr. D. N. Avasia on lac and lac cultivation with reference to conditions in the Central and United Provinces. The lac incrustation is mainly formed by the female insect after impregnation, and continues for a period of two and a half months, when the insect enters upon a period of rest; a month later the larvæ developing from the red liquid in the insect sac provide a new swarm, so that there are two broods in the year. It is stated that after swarming the lac is practically free from colouring matter, and therefore more valuable, since the lac dye, formerly the important substance, is now a useless impurity.

AN article on the gardens of Achnashie, Rosneath, by the Rev. D. Landsborough, will be found in the Transactions and Proceedings of the Botanical Society of Edinburgh (vol. xxiii., part iv.). Two silver firs, averaging 112 feet in height and with a girth of about 22 inches at breast height, are noted specimens. Such flowering shrubs as rhododendrons, kalmias, and fuchsias flourish, and bamboos are a special feature in the garden. Of the latter, the four species *Arundinaria nitida, Bambusa fastuosa, Phyllostachys Henonis*, and *Phyllostachys mitis* are mentioned as the most suitable and attractive; *Arundinaria Falconeri* was the first species planted in 1885. Two species flowered in 1904, and two others in 1906; seed that has germinated was obtained from *Arundinaria Simoni* and *Arundinaria Falconeri.*

THE report for 1907, by Mr. J. H. Maiden, on the botanic gardens and Government domains in Sydney, New South Wales, contains, as usual, notes on native plants brought into cultivation, as well as introductions from other countries. Reference is made to the asclepiad creeper *Tylophora grandiflora* that grows in the northern brushes of the colony, *Oncinocalyx Betchei* (Verbenaceæ), a scarce local evergreen shrub, and *Pherosphaera Fitzgeraldi*, a curious conifer from the Blue Mountains that thrives among the Todæas and filmy ferns, since its natural habitat is in spray-bedewed gorges. *Morrenia brachystephana*, an asclepiad from the Argentine, is recommended as a strong evergreen climber, and *Verbesina virginica*, a robust perennial composite from North America, for the shrubbery.

AN exceedingly interesting problem is presented by the production of a vegetative cross between two species of Solanum, the nightshade and the tomato, defined by the raiser, Prof. H. Winkler, as a graft-hybrid. The method of procedure consisted in grafting a scion of the nightshade on the cut apex of a tomato plant; when the graft had matured, a transverse cut was made across the apex at a point where tissue of both scion and stock was present, so that the buds arising from the callus formed at this position might partake of the characters of both species. In this way various adventitious shoots were obtained, which were separated and grown to form independent plants. One of these with distinct characters is the specimen described and named as *Solanum Tubingense* in the *Berichte der deutschen botanischen Gesellschaft* (vol. xxvia., part viii.). Subsequently four other hybrids were obtained, which are described in the *Zeitschrift für Botanik* (vol. i., part v.).

MR. A. E. P. WEIGALL, chief inspector of antiquities in Upper Egypt, contributes to the *Century Magazine* for June a well-illustrated article giving an account of the recent discovery of the tomb of Horemheb, who started as a commander in the army of Amenhotep III., married the heiress to the throne to which he succeeded in B.C. 1350, and died in B.C. 1315, after a reign of thirty-five years. His tomb was constructed close to that of Amenhotep II. in the Valley of the Tombs of the Kings at Thebes. The tomb had already been rifled by ancient thieves, the great pink granite sarcophagus had been pillaged, and of the four skulls found it is now impossible to say which wore the crown of the Pharaoh, and this in spite of the fact that the sarcophagus bears figures of Isis and Nephthys, with their wings spread out, as though protecting the royal mummy.

IN the May number of *Man* Mr. T. A. Joyce describes a collection of steatite figures, known as Nomori, from Sierra Leone, a class of objects to which attention was first directed by Prof. Rütimeyer, of Basel. These figures, represented in a sitting or standing posture, are of a grotesque character. Mr. Greensmith, who is well acquainted with them, calls them "farm-devils," by which he apparently means images of tutelary spirits intended to protect the crops. Associated with them is a class of curious metallic rings, and when thus found they are called Mahai-yafei, "king spirit or king devil," which Mr. Greensmith interprets to mean that "they are employed in the courts of the chiefs for the witnesses to be sworn upon." It is possible that the tatu marks found on some of these figures may throw some light on their age and suggest the people by whom they were made. In this region tribal society is so disorganised as a result of long periods of war and social disorganisation that local tradition is vague, and does little to suggest their origin; but there seems no reason to believe that they are of any considerable age, and in artistic style they are much inferior to the remarkable basalt sculptures discovered in southern Nigeria, with which they have nothing in common except the mystery which at present surrounds the origin of both.

THE most important contribution to the fourth number of the first volume of Annals of Archæology and Anthropology, issued by the Liverpool Institute of Archæology under the editorship of Prof. Myres, is the report by Messrs. Wace, Droop, and Thomson on early civilisation in northern Greece. The excavation conducted by this party of a mound at Zerelia shows that the identification of the site with Itonos and the temple of Athene Itonia, patron goddess of Thessaly, can be no longer admitted; but the mound disclosed no fewer than eight successive layers of prehistoric deposits, the earliest of which cannot be dated later than 2500 B.C. The importance of this and the excavations conducted by Prof. Tsountas rests on the fact that it is in northern Greece and in the possible linking of it with the culture of the Balkans and of Central Europe that light may be expected on the ethnological problems of the Ægean. The mound-builders in northern Greece seem to have been in occupation of this region from 2500 B.C. to 2000–1800 B.C., when many of these structures were abandoned. About 1200–1100 B.C. Mycenæan influence reached the Gulf of Pegasæ, and thus for the first time the Neolithic folk of northern Greece came into contact with the bronze-users of the south. In the north, then, the Neolithic culture seems to have survived until late Mycenæan times. The relations of this culture, at least as regards pottery, with that of Servia, Thrace, Galicia, Bessarabia, and Central Europe are still obscure, and much further exploration is needed before this tangled archæological problem can be definitely settled. At present the choice lies between two alternatives. We may accept the views of Dr. Wosinsky, that the primitive culture of Central Europe is derived from the Ægean, or we may hold with Dr. Hubert Schmidt that early Greek civilisation came from Central Europe. Meanwhile, this band of explorers is again at work, and further details of their investigations will be awaited with much interest.

MR. R. LANGTON COLE has sent us a prospectus of small artificial dew- and rain-ponds made by Messrs. F. C. Lowe and Son, Ltd., Sittingbourne, for coverts and other rearing places where a good supply of clean water is required without the necessity for frequent renewal. The troughs appear to consist essentially of one shallow metal tray inverted within another. It is claimed that, once having been filled with water, the troughs are always full, sufficient rain and dew being collected to keep up a constant supply in the driest of summers. Messrs. Lowe state that their troughs act by collecting whatever dew there is and retaining it by means of the cover; and an experiment made by Mr. Cole, extending over six weeks, indicates that moisture is condensed freely upon the under side of such a cover and prevented from evaporation. The collection and preservation of atmospheric moisture by these "Never-empty" troughs is of decided interest in connection with the study of dew-ponds.

THE seventeenth annual report of the Sonnblick Society for 1908 includes results for several of the more important mountain stations. At the Sonnblick (3105 metres) the mean yearly temperature was 19·2° F., absolute maximum 44·1°, in May, minimum −19·5°, in January. Snow or rain fell on 220 days, and fog occurred on 245 days. April, 1908, was one of the coldest since the commencement of observations in 1887, being nearly 5° F. below the average. Edler v. Obermayer gives an interesting historical account of the several stations on the Obir, including the summit station (2143 metres), established in 1891, and named the Hannwarte in honour of Dr. J. Hann, the great advocate of mountain observatories. Dr. Hann contributes a summary of the meteorological results at the Hochobir station (2044 metres), with monthly and yearly results for each year, 1851–1908. The summer maxima reach 77° F., and the minima often fall below −13° during winter; the lowest was −17·1°, in January, 1907.

THE administration report of the Prussian Meteorological Institute for the year 1908 shows that arrangements are being made for greater activity in all branches of the useful work carried on. With this view, the scientific staff, both at the central office in Berlin and at the Potsdam Observatory, has been re-organised; the form and contents of several of the regular publications have been modified, and efforts are being made to bring these up to date, so that more time may be available for fresh scientific investigations. Weekly meetings are held, both at Berlin and Potsdam, for the discussion of important recent publications, from which the junior staff and students naturally derive considerable benefit. Much time is devoted to constantly-increasing inquiries for weather information for scientific, industrial, and legal purposes; during the year in question, 475 such inquiries were received by letter, in addition to personal applications, and specimens of such letters and replies, which frequently necessitate reference to unpublished data, are printed in the report. In all these respects there is much analogy between the English and German organisations. For the first time an appendix has been added to the annual report, dealing with interesting scientific matters relating to weather conditions of the year and to special investigations. Among the latter is an article by Dr. Hellmann on the window exposure of thermometers, undertaken with the view of showing the small difference between the older observations and those made more recently with better exposure. The author points out that the window exposure is still the one most generally used in Europe, viz. in Scandinavia, Germany, Austria, Switzerland, and Italy, and to some extent also in Spain and Portugal. Illustrations are given of some of the window-screens now generally in use.

The results of meteorological and magnetical observations at Stonyhurst College Observatory for 1908 have been received. This observatory occupies an important position in Lancashire, and its observations go back for sixty-one years; it is one of the observatories adopted by the Meteorological Committee in 1867 for the supply of hourly observations, and although, for financial reasons, the subsidy originally allowed by the committee has had to be greatly reduced, it still supplies automatic records to the Meteorological Office. The year 1908 was, on the whole, mild and quiet, pressure, temperature, and rainfall being above the average; the wind velocity indicated a gale on four days only, the number of miles traversed during the year being the smallest on record. With regard to magnetic work, tabulations are supplied quarterly to the Netherlands Meteorological Institute for the International Committee on Terrestrial Magnetism, and considerable time has been devoted to an examination of the magnetograms of the last forty years in connection with solar influence. The work is not complete, but the preliminary results show many well-established recurrences of disturbances at 24-hour intervals, with a maximum of frequency between 9h. and 11h. p.m. (G.M.T.). The solar surface has been observed on all available days; on one day only the surface was found quite free from spots. The secondary maxima of the solar activity and magnetic disturbance, in 1907, is shown as follows:—

	1903	1904	1905	1906	1907	1908
Spot area...	1·9	2·5	6·8	4·8	5·8	4·6
Declination range ...	11·8	11·9	14·9	14·2	14·7	14·5

the unit of area being 1/5000 of the visible surface and that of declination being one minute of arc.

Dr. G. Agamennone contributes to the *Bolletino* of the Italian Seismological Society, vol. xiii., No. 2, an account of the seismological service which was established in Italy after the Riviera earthquake of February 23, 1887. There are now 678 observatories of the first, second, and third order distributed, so far as possible, at even distances of about 20 km. apart over the kingdom of Italy and in the islands belonging to it, which report regularly to the central office in Rome. This service, the special purpose of which is to obtain a record of every earthquake which takes place, enables the central office to form an estimate of the extent and importance of each shock, and to issue interrogatories to places not included in the network of observatories when such a course seems desirable. A special section of the daily weather report is devoted to a brief account of the reports of earthquakes, which are published more fully in the *Bolletino* of the Seismological Society. Besides this organisation for the study of local earthquakes, thirty-four observatories are equipped with one or more seismographs capable of registering distant earthquakes.

Mr. Ll. T. Jones, of Bingley Grammar School, has designed a simple apparatus which can be used by young students to measure the diffusion of gases. It consists essentially of a U-tube with one long and one short arm. The short arm, into which gas can be passed by a side tube, is closed with a piece of clay pipe-stem sealed at the top. To perform an experiment the gas is first passed through drying tubes and thence into the short arm of the U-tube. The longer arm is then filled with mercury. The gas in the shorter tube meanwhile will have been forced through the porous pipe, so that the shorter arm will now be full of mercury. The rate of diffusion under different pressures can easily be estimated. The apparatus can be procured from Messrs. W. and J. George, Ltd., of Great Charles Street, Birmingham.

The Journal of the Röntgen Society for May contains a well-illustrated paper, by Mr. J. H. Gardiner, on the origin, history, and development of the Röntgen-ray tube. The council of the society has recently got together a collection of tubes showing the development of the modern apparatus from the original Crookes tube used by Röntgen in 1896, and has presented it to the authorities of the South Kensington Museum. Several of the improvements illustrated by the collection are discussed by Mr. Gardiner, but the most important step taken recently appears to be the substitution of tantalum for platinum in the anti-kathode by Messrs. Siemens. The higher melting point of tantalum makes it possible to employ currents of 30 milliamperes through the tube. With a well-focussed tube a current of this magnitude will melt the front surface of a tantalum anti-kathode 1 millimetre thick, and Mr. Gardiner advocates the use of a magnet to direct the kathode rays to a new portion of the surface.

We have received a copy of a communication made recently by Drs. Scheel and Heuse, of the Physikalisch-technische Reichsanstalt at Charlottenburg, to the *Zeitschrift für Instrumentenkunde*, dealing with the relative efficiencies of many of the methods at present in use for the production of high vacua. In each case a 6-litre vessel of dry air was evacuated, in most cases from an initial pressure of about 10 millimetres of mercury obtained by a water or oil pump. A simple Toepler pump having a vessel of 850 c.c. capacity reduced the pressure to about 0·7 of its initial value in three strokes, and took five hours to reduce the pressure from 0·06 millimetre to 0·00002 millimetre. A Toepler pump as modified by Drs. von Reden and Rosenthal, requiring only 3·5 kilograms of mercury to work it, reduced the pressure from 15 millimetres to 0·00002 millimetre in a little more than two hours. A Gaede pump, starting from an initial pressure of 12 millimetres obtained by a Gaede oil pump, reduced the pressure to 0·00001 millimetre in an hour. The method which the authors find most convenient is first to reduce the pressure to about 0·01 millimetre by means of a Gaede pump, and to obtain further reduction by absorption of the remaining gases by cocoa-nut charcoal cooled in liquid air. By this means the pressure was reduced in less than two hours from 0·01 millimetre to 0·00001 millimetre of mercury.

Referring to the reproductions of South African rock-engravings in last week's Nature (p. 411), Mr. R. Lydekker writes to point out that the figure given as a buffalo is misnamed, the animal represented being an eland.

A NEW method of illumination for photographic work, particularly for enlarging and for projection purposes where great magnification is not required, has been brought under our notice. The apparatus is known as the "Petrolite" photographic lamp, and is sold by Mr. A. J. Garrad, of 317 High Holborn, W.C. The lamp consists essentially of an ordinary Welsbach incandescent gas-mantle, which is raised to a condition of incandescence by the use of petrol gas. The petrol is contained in a metal chamber, but is all taken up by a highly absorbent material; consequently there is no loose petrol in the container. Once it is absorbed it does not escape, but is only given up again in the form of vapour as it is required at the burner. If from any cause the apparatus is overturned, the light goes out. The whole appliance will go inside an ordinary lantern body, and is obviously a good arrangement where either ordinary gas or any method of electrical illumination is unobtainable. The price is reasonable, and the cost of running is lower than that of any other similar method of incandescent gas lighting. The apparatus may be commended to those who require a source of light that must be independent of any extraneous supply of gas or electricity.

WE have received from the Bausch and Lomb Optical Co., of 9 Thavies Inn, Holborn Circus, E.C., its latest catalogue of microscopes, apparatus for photomicrography, and various projection appliances. From it we gather that the Bausch and Lomb Co. is now acting in close cooperation with Messrs. Carl Zeiss, of Jena, and that many of its products are based on the investigations carried out by the latter firm. The apparatus for photomicrography appears to be now of a very complete order, and is in general design much the same as that made by Messrs. Zeiss, the camera and the portion of the apparatus supporting the microscope and optical accessories being regarded as two separate appliances. While this is what some regard as an objection, the whole apparatus not being fastened to one single solid base, yet, on the other hand, it ensures that any movement of either component is not communicated to the other part. The apparatus for the projection of both opaque and transparent objects is of new design, and appears to be built in a very substantial way, and is arranged to carry out work of almost any description in this direction As the Bausch and Lomb Co. is now fitting up new showrooms in London, where all these appliances may be seen under working conditions, a visit at the present time cannot fail to be of interest to those who contemplate purchasing such apparatus.

THE Colorado School of Mines Quarterly for April is wholly devoted to a short monograph on tungsten, by H. R. Van Wagenen. The first part, which is more of local interest, gives an account of the Colorado mines and mill practice. The second part deals with the physical properties and uses of tungsten, its mineralogy, chemistry, and metallurgy. The preparation and properties of the tungsten alloys are also described, and at the conclusion of the paper there is a useful bibliography. The main applications of tungsten are found in the preparation of various tungsten steels and of metallic filaments for lamps, other uses being found for tungstates as a mordant in dyeing, in the preparation of non-inflammable fabrics, and as a pigment.

ATTENTION has been directed more than once to the growth in size, year by year, of the "Statesman's Year-book," published by Messrs. Macmillan and Co., Ltd., and edited by Dr. J. Scott Keltie with Mr. I. P. A. Renwick's assistance. The 1909 issue, which is now available, represents a successful attempt to reduce the bulk, without affecting the usefulness, of this valuable statistical and historical annual. This satisfactory reduction by some 300 pages has been accomplished by the introduction of uniform type, the elimination of superfluities, economies of space, and various re-arrangements. The present issue has several new features; some deal with recent changes in the altered constitutional character of several countries, others with new census returns and various other matters of public interest, while a new section gives a brief statement with reference to the Hague Tribunal, with a list of members. The plates, which are all new, include a diagram exhibiting British and German naval expenditure on new construction during the last decade; and maps illustrating the Anglo-Siamese Treaty, 1909; the Anglo-Abyssinian Boundary, 1902 and 1907; the Anglo-German and German-French Kamerun Boundary, 1906 and 1908; the All Red Route; and the military divisions of India. The price of the year-book remains 10*s.* 6*d.* net.

ERRATUM.—Mr. Hy. Harries informs us that on p. 403 of NATURE of June 3 the ship on which Dr. von Neumayer returned from Melbourne in 1864 was erroneously given by him as the *Sovereign of the Seas*; it should have been the *Garrawald.*

OUR ASTRONOMICAL COLUMN.

THE RINGS OF SATURN.—Prof. Levi-Civito has written an interesting pamphlet on the mechanics of the ring of Saturn ("Sulla Forma dell' Anello di Saturno," Premiale Officine Grafiche Carlo Ferrari, Venezia). His conclusion is that under certain hypotheses the angular velocity of each ring exceeds that of a satellite at the same distance. He points out that the differential equations applicable to a flexible substance are applicable, even in spite of Clerk Maxwell's demonstration that the ring consists of discreet particles. He therefore reverses the procedure of Stazio in Dante:—

> "Trattando l'ombre come cosa salda."

CHANGES IN THE FIGURE AND DIMENSIONS OF THE SUN.—In a mathematical paper appearing in No. 4, vol. xxix., of the *Astrophysical Journal* (p. 257, May), Prof. Moulton discusses the possibility of observing changes in the form and dimensions of the sun from the dynamical point of view.

After reviewing briefly the practical methods previously employed to detect any possible variation, he attacks the problem from various theoretical standpoints, with reasonable assumptions, and arrives at several interesting conclusions. First, he shows that the difference between the equatorial and polar diameters must be less than 0·07″ as seen from the earth, and is, therefore, beyond observation by any means yet employed. Then, considering possible oscillations, he demonstrates that, if they exist in the sun, their period cannot exceed a few hours, although different periods might combine to form "beats."

It seems possible, at first glance, that any possible shrinking might be demonstrated by the change in the rate of rotation before becoming directly measurable from the earth, but Prof. Moulton shows that this is unlikely. Variations of diameter would presumably produce corresponding variations of temperature, but it is surprising to find that a variation of the apparent diameter by 0·1″ should produce a change of 1400° C. in the temperature. Considering the effect of such dilatational oscillations on the power of radiation, it is shown that, were the diameter undergoing changes amounting to 0·1″, as seen from the earth, the rate of radiation at maximum would be 2·56 times that at minimum radius; in other words, the variation would be about one stellar magnitude. Langley and Abbot believed they had observational evidence of a 10 per cent. variation in the radiation, but this would correspond